

## REMARKS

Claims 39-51, as amended and new claim 78 appear in this application for the Examiner's review and consideration. Claims 65 and 67-77 have been withdrawn by the Office as directed to non-elected subject matter. The applicants reserve the right to prosecute the withdrawn claims in a divisional application prior to the issuance of the present claims. The claims have been amended to more particularly point out the claimed subject matter and to correct inadvertent minor spelling and editorial errors, but no new matter has been added. New claim 78 recites the subject matter of claim 43, as if it was written in independent format and therefore, no additional search is necessary as this claim's scope is commensurate with that of claim 43, which has previously been searched.

The Office never issued a restriction as required under 37 C.F.R. § 1.242(a). Nevertheless, to advance prosecution applicants will consider claims 65 and 67-77 as withdrawn. Applicants would like to note that this purported restriction was consistently traversed to ensure the opportunity to rejoin the withdrawn claims as permitted by the rules.

Claims 39-51 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for the reasons set forth on pages 3-5 of the Office Action. Applicants have amended the language as explained by the Office and therefore, the rejection is rendered moot.

Claims 39-43, 46-48, 50 and 51 stand rejected under 35 U.S.C. § 103(a) as purportedly rendered obvious over U.S. Patent No. 4,814,316 (the '316 patent) for the reasons set forth on pages 4-6 of the Office Action. Applicants respectfully traverse.

When the Supreme Court addressed the issue of obviousness, it stated that the *Graham v John Deere Co. of Kansas City*, 383 U.S. 1 (1966) factors still control an obviousness inquiry. *KSR International Co. v. Teleflex, Inc.* 127 S.Ct. 1727 (2007). Those "factors are: 1) the scope and content of the prior art; 2) the differences between the prior art and the claims; 3) the level of ordinary skill in the art; and 4) objective evidence of nonobviousness." *Takeda Chemical Industries, Ltd. v. Alphapharm Pty. Ltd.*, 492 F.3d 1350, 1355 (Fed. Cir. 2007) (internal quotations removed); quoting *KSR International Co.*, 127 S.Ct. at 1734 (quoting *Graham* 383 U.S. at 17-18); see M.P.E.P. 2141 (8<sup>th</sup> Ed. 2007). While the *KSR* Court rejected a rigid application of the teaching, suggestion, or motivation test in an obviousness inquiry, "the Court acknowledged the importance of identifying 'a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claims invention does' in an obviousness determination." *Takeda Chemical Industries, Ltd.*, at 1356 (emphasis added); quoting *KSR*, 127 S.Ct. at 1731. The

need for specificity is paramount, particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected the components for combination in the manner claimed. *In re Sang Su Lee*, 277 F.3d 1338, 1343 (Fed. Cir. 2002). The Examiner's conclusory statements do not adequately address the issue of motivation to combine; the factual question of motivation is material to patentability, and can not be resolved on subjective belief and unknown authority. *Id.*

The Office fails to establish a *prima facie* case of obviousness as it fails to set forth the *Graham* factors and a reasoned basis to support an analysis necessary to conclude obviousness. Specifically, the Office has not established the differences between the prior art and the claims or identified a reason that would have prompted a person of ordinary skill in the relevant field to place vanadium within the skeleton of the molecular sieves or place it in the amount and in the manner as claimed as required under *KSR* and *Graham v. Deere*.

The Office has cited the '316 patent as prior art. The '316 patent purportedly discloses predominantly a FCC catalyst which prior to use or during use has a composite structure which is wholly crystalline. (The '316 patent, col. 8, ll. 65-67). The crystalline composite has multiple phases one of which is a NZMS-37 (unlike that of the prior art) which contains aluminum and phosphorus as part of the crystal framework. (*Id.* col. 9, ll. 25-29). The phases are substantially crystallographically indistinct from one another and the phases of the composite are in integral lattice association with each other, and it is believed that the phases are joined together by direct chemical linkages. (*Id.* ll. 59-64). The phases of the composites used in the invention relate to each other because they each possess essentially the same crystalline framework structure. (*Id.* col. 15, ll. 24-26). The phases of the composites are not simple blends or physical mixtures that are bound together by an adhesive generated by a third component which fails to satisfy the crystallographic characterization of the phases. (*Id.* col. 9, ll. 64-68). In a typical case, the outer layer will weigh less than the deposition substrate, because it is desirable that the outer layer contain a more active NZMS-37 containing phase which is the most operative catalytic component of the composite. (*Id.* col. 14, ll. 8-13).

The differences between the '316 patent and the claimed invention are numerous. The Office states without support that: "the materials specified in the reference, for example MeAPSO or ELAPO, are indistinguishable from the molecular sieves employed by applicant. Pellet indicates by the very nomenclature that any incorporated metal will be in the framework rather than simply impregnated on the composition." (Office Action p. 5). Assuming arguendo that this is true (which applicants do not admit), then claims 43-45 and

new claim 78 are patentably distinct because the sieves are directed to VS,-n, VAPO-n, or VSAPO-n which are different sieves (as defined by their nomenclature) than those cited by the Office and the reference does not suggest such sieves or exchanging MeAPSO or ELAPO sieves for those of the claims. The selection of vanadium has beneficial properties not shared with the sieves of the prior art.

The particular use of vanadium in the present invention facilitates desulfurization and adds structural stability to the molecular sieve. The present invention specifically defines a molecular sieve with Vanadium in the skeleton, while the '316 patent is silent about vanadium in the skeleton. Once vanadium is incorporated into the skeleton of the sieve, the composition is stabilized because the destruction of the structure of other components (such as zeolite Y) caused by the loss of vanadium is minimized. Vanadium within the skeleton has less tendency to fall-off the molecular sieve and/or be lost under reaction conditions, in particular under high temperatures and/or hydrothermal conditions. Therefore, the composition for desulfurization of the invention not only removes sulfur but also stabilizes the composition. This selection of vanadium over other metals is unique to the present claims and as described above, such selection invention has properties not shared with the other metals. Further, the '316 patent has not suggested the sole use of vanadium in the desulfurization composition or within the skeleton of the sieve.

Also, the recited composition for desulfurization comprises one or more molecular sieves, a supporter, a binder, and a zeolite, wherein the molecular sieves have a skeleton and vanadium is incorporated into this skeleton. Unlike the composite of the '316 patent, the composition of the claims is a blend or physical mixture of materials. Example 1 of the application sets forth the mixture where all materials are mixed together and spray-dried to obtain the composition for desulfurization of the claims. Thus, the recited composition can be contrasted with the composite of the '316 patent where the composite has phases that are in integral lattice association with each other, and it is believed that the phases are joined together by direct chemical linkages, each having essentially the same crystalline framework structure. In fact, the '316 patent clearly states that its composite is not a simple mixture or physical blend of materials. Given this required unified crystalline structure, the '316 patent teaches against the physical mixtures of the claims. It is clear that the reference would discourage the skilled artisan to use a composition for desulfurization as recited in the claim.

In other words, while the '316 patent has a single crystalline component system that contains a zeolite and a molecular sieve formed together as the same crystalline structure, the recited composition has a mixture of molecular sieves and zeolite (in addition to a supporter

and binder). According to the '316 patent, one advantage of the single crystal component system is a reduction in side reactions that took place in the interior of the sieve: "[i]t has been determined that much of the benefits of NZMSs as catalysts are achieved in the outer surface portion (mantle) of the sieve particle. Where a NZMS is employed as a catalyst in a chemical reaction in which irreversible secondary reactions occur that generate by-products, much of the primary reaction occurs in the outer mantle and much of the secondary reaction(s) occurs in the core area of the molecular sieve particle." (*Id.* col. 10, ll. 57-64). Thus, the teachings of the '316 patent discourage the skilled artisan from developing a composition for desulfurization where the composition has surfaces of different materials available for reaction (including the undesired irreversible secondary reactions).

In the analysis, if one starts from this single crystal unitary system, the Office or the reference must provide a reason that would have prompted a person of ordinary skill in the relevant field to change this single crystal structure into the multiple component mixture system of the claims. Yet, no reason was provided to ignore this explicit teaching.

Given these above-described extensive differences between the reference and the present claims and the fact that the reference teaches against the claims, the present invention is not rendered obvious by the '316 patent.

Accordingly, the rejection of claims 39, 41-43, 46-48, 50 and 51, under 35 U.S.C. § 103(a) as rendered obvious by the '316 patent cannot stand and should be withdrawn.

Accordingly, it is believed that claims 39, 41-51, and 78 are now in condition for allowance, early notice of which would be appreciated.

If any outstanding issues remain, the examiner is invited to telephone the undersigned at the telephone number indicated below to discuss the same. No fee is believed to be due for the submission of this response. Should any fees be required, please charge such fees to Kenyon & Kenyon, LLP Deposit Account No. 10-0600.

Respectfully submitted,

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